European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available on-line at: www.oapub.org/edu

doi: 10.5281/zenodo.3762575 Volume 7 | Issue 4 | 2020

INFORMATION PROCESSING AS LEARNING STRATEGY: THE CASE OF GRAPHIC ORGANISERS

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Abstract:
The use of information processing is one of many language learning skills learners can use to help them strategize their learning. One example of information processing is through the use of graphic organisers. It has been reported that learners use different strategies to lean a new language. However, the use of these language learning strategies is further facilitated with the help of graphic organisers. Furthermore, using graphic organisers is one form of compensatory strategy where leaners replaces written information to pictures. While doing so, learners are able to use their metacognitive strategies to make plans for more learning. In addition to that, learning another language becomes less challenging when learners may not have much previous background of words as they had in their mother tongue. The use of graphic organisers helped learners learn language in a less wordy way; perhaps even in a less threatening environment. This quantitative case study used survey as the instrument to investigate how language learners fell about the use of graphic organisers as part of their language-related activities. The instrument uses 5 Likert scale and has 4 sections. Section A is the demographic profile, section B is the Cognitive Overload, section C is the Schema and Section D is the Dual Coding. Findings revealed interesting pedagogical implications towards the use of graphic organisers in the language classrooms.

Keywords: graphic organisers, language learning strategies, cognitive overload, schema, dual coding

1. Introduction

1.1 Background of Study

The world of teaching has evolved over the years. The focus in the "classroom" has moved from teacher-centred, to student-centred and then materials centred and perhaps now medium centred. In addition to that, millennials' style of learning is making

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educators change the way learning materials are to be taught. According to Meltzer (2017), millennials have short attention spans. However, Carufel (2018) reported that their (the millennials) attention spans are not shrinking, but "*rather evolving to be more selective".* According to Rahmat (2011), it is not that learners do not understand what is taught- they choose to understand what they want to. This is supported by Goh (2019) who mentioned that instead of having an eight-second attention span, millennials have an "*eight-second filter*". This filter helps learners to quickly assess whether the information presented is relevant to them (the learners).

As such, it would be helpful to understand how millennials learn. According to Laskari (2015), millennials learn under the 5R conditions. With reference to figure 1, Learners need to learn from method that were (a) research-based. They prefer learning materials that caters to their various needs such as visual, auditory and kinesthetic. In addition to that, millennials have shorter attention spans than their older generation peers.

Millennials also learn best when they see the (b) relevance, of what they learn to what they need. Millennials are great at "googling" to get information. They do not appreciate information for its own sake. They do not value theories. They only value information if they can see its relevance to their lives. Next, learners need to know the (c) rationale of their learning activities. Finally, they need to learn in a (d) relaxed environment that and enables (d) rapport among learners and teachers.

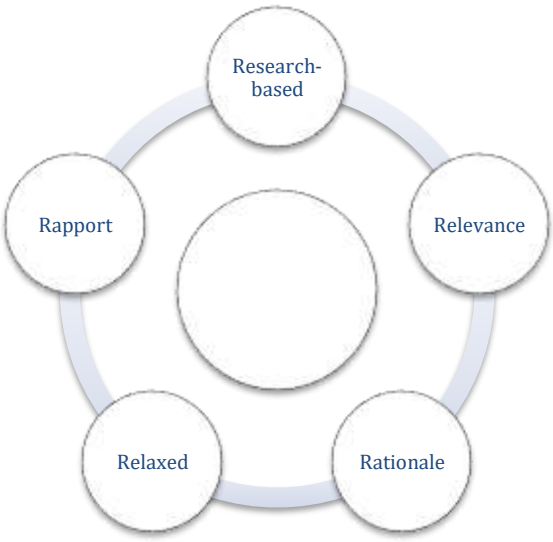

Figure 1: Definition of Learning for the Millennials
(source: Laskaris, 2015)

1.1 Statement of Problem

Students, at any level of study, need writing skills to get by in their studies. In addition to that, in Malaysian institutions of higher learning, the language of communication is English. Students need to presentations, as well as write reports and assignments in English. Many of the institutions of higher learning are filled with millennials and millennials learn and do things differently from their older generation peers. The

problem is according to Rahmat (2018), writing is a skill not easily taught nor popularly liked by students. In addition to that Goh (2019) reported that millennials actually use the "*eight-second filter*" when it comes to learning. After filtering, they decide they find the learning to be of relevance to them or not. According to Lakaris (2015), learning has to be "*relaxed*" for the millennials to want to participate. Furthermore, according to Sharma (2018), millennials prefer learning through "*less is more*". So, this study looks into the use of graphic organisers to make writing feasible in a way that millennials like.

1.2 Objective and Research Questions

The objective of this study is to explore the use of graphic organisers in the writing class. Specifically, this study investigates how the dual code, schema, cognitive overload theories influence the use of graphic organisers in writing. This research is done to answer the following questions:

1) How does the use of graphic organisers influence the use language learning strategies?
2) How does cognitive overload influence the use of graphic organisers in language learning?
3) How does the use of schema influence the use of graphic organisers in language learning?
4) How does the use of dual coding influence the use of graphic organisers in language learning?

2. Literature Review

2.1 Introduction

This section discusses issues on classroom teaching and learning, language learning strategies, past studies, as well as the theoretical framework of the study.

2.2 Classroom Teaching and Learning

Teaching changed over the years from teacher centred to student-centred and perhaps even now medium centred. The content of teaching is as important as the way the content is to be taught. According to Rahmat (2020), there are needs to be constant innovation in the teaching and learning environment. With reference to figure 2, the role of teachers has changed with changes in the materials used to teach. These changes, then, creates changes in the learners' role in the classroom. Learners are making changes to the teachers' and materials role perhaps the traditional teachers' role needs to be adjusted to suit the learners' role in the millennium classrooms.

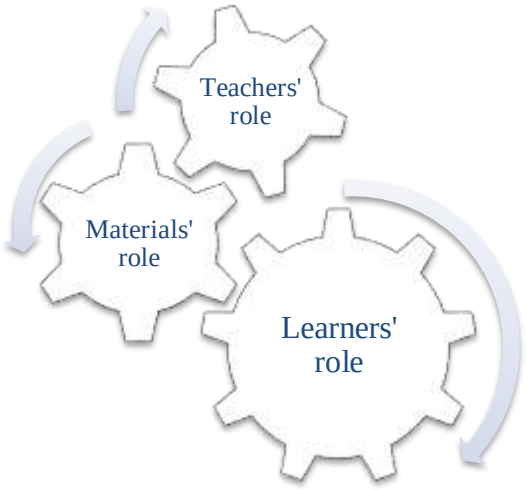

Figure 2: Environment for Innovation in Learning
(source: Rahmat, 2020)

2.3 Information Processing

The brain does several things during information processing. Based on figure 3, Broadbent (1958) said that when a stimulus is given to the brain to process, the input is first processed based on the type of stimuli-different stimuli would be processed in different ways. Next the information goes to the storage processes. This is the stage where the information A lot can take place during this storage process. In the classroom, teaching -learning activities can take place to maximise learning. The output processes involve the learners' showing proof of learning through submission of work done. The response can be done both from the teacher and the learner to improve future teaching-learning processes.

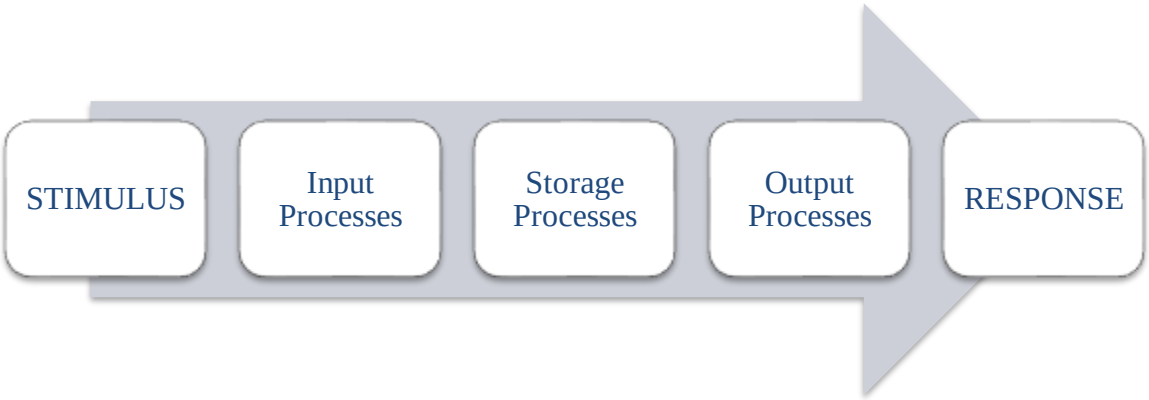

Figure 3: Information Processing
(source: Broadbent, 1958)

2.4 Graphic Organiser

Graphic organisers have been used by both teachers and students. Teachers use graphic organisers to scaffold information to students. Students use graphic organisers to understand concepts in manageable chunks. According to Delrose (2011), graphic organisers provide a foundation for an explicit, organized way of visually expressing the

relationship between new and existing knowledge. The Institute for the Advancement of Research in Education (IARE, 2003) reveals three cognitive learning theories that support the use of graphic organisers. With reference to Figure 4, the theories are "Dual Coding Theory", "Schema Theory", "Cognitive Load Theory". Dual coding theory assumes that individuals code the information both in verbal and non-verbal ways. Non-verbal also includes conveying messages using words and graphical methods. Schema theory suggests that there exist schemas or information networks within the memory and learners can relate new information to the existing knowledge organized in the schemas using graphic organizers. On the other hand, in cognitive load theory it is accepted that working memory (short-term memory) has a maximum capacity to process the information, therefore when the load is exceeded, learning does not take place. When they are used appropriately, graphic organizers reduce the cognitive load and enable reaching more resources so that the new material can be learnt.

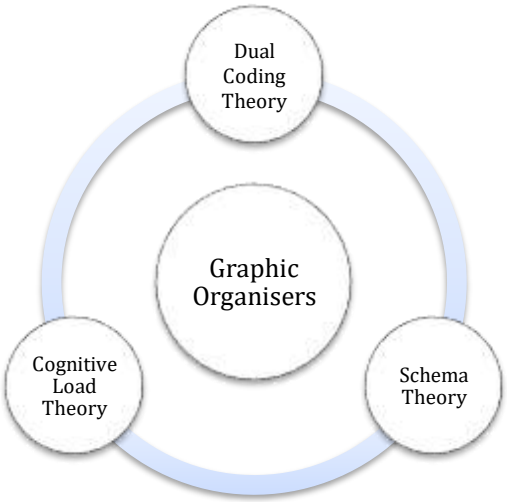

Figure 4: Theories that Support Graphic Organisers in the Learning Process (IARS, 2003)

There are many uses of graphic organisers. Hoy and Miskel (2008) provide a summary of many of the cognitive exercises provided for through the use of graphic organizers. Graphic organizers, therefore, can do the following:

- guide perception and attention by previous knowledge;
- help students focus on the most important information;
- help students make connections between new information and what they already know;
- provide students with opportunities to use both verbal and stories and visual images;
- present information in an organized and clear fashion. (p. 65)

2.5 Language Learning Strategies

Over the years, language learning strategies have been characterised in several ways by different researchers. Hardan (2013) said that language strategies are skills learners use when they learn a language-usually second or even foreign language. When it comes to

language learning strategies, no one strategy is said to be the best or even the worst strategy. Each strategy is used by different learners to suit a variety of situations. Figure 5 shows three types of language learning by O'Malley & Chamot (1990). They classified the strategies into three; metacognitive strategies, cognitive strategies, and social/affective strategies. Metacognitive strategies involved thinking about (or knowledge of) the learning process. It also involves the learners to plan for learning, monitoring learning while it is taking place, or self-evaluation of learning after the task had been completed. Next, cognitive strategies, which involved mental manipulation or transformation of materials or tasks, are intended to enhance comprehension, acquisition, or retention. Finally, social/affective strategies, requires the learners to use social interactions to assist in the comprehension, learning or retention of information. This strategy also includes the mental control over personal affect that interfered with learning.

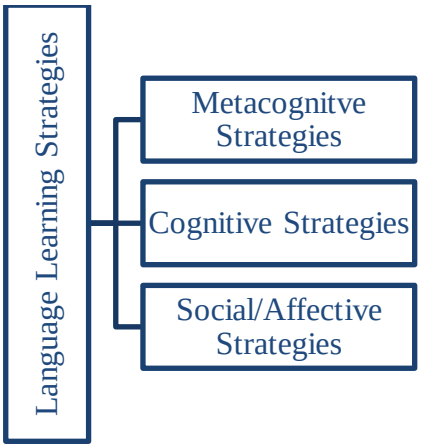

Figure 5: Language Learning Strategies
(source: O'Malley & Chamot, 1990)

In addition to that, some learners depended on direct and indirect strategies to learn languages. Oxford (1990) presented a slightly different set of categories (figure 6). She said learners use either the (a) direct or (b) indirect learning strategies when learning languages. Direct strategies are a set of mental processes for learning. These strategies include (i) memory, (ii) cognitive and (iii) compensation strategies. Memory strategies are used for remembering and retrieving new information. Cognitive strategies are used by learners to understand and produce the language. Compensation strategies are used for using the language to make up for the lack of relevant knowledge.

Next, Oxford (1990) listed three types of indirect strategies; (i) metacognitive, (ii) affective and (iii) social strategies. Firstly, metacognitive strategies involve the learners controlling their own cognition through the co-ordination of the planning, organization and evaluation of the learning process. Affective strategies involve the learners' regulation of emotions, motivation and attitude towards learning. Social strategies involve the interaction with other learners to improve language learning and cultural understanding.

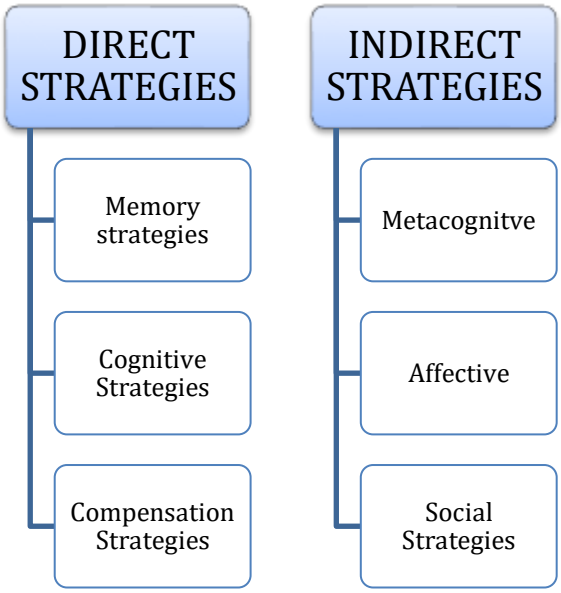

Figure 6: Direct and in direct Learning Strategies (source: Oxford, 1990)

2.6 Past Studies

Certain learning skills are known to help the learning of foreign language. Firstly, some strategies such as metacognitive and memory help learners learn foreign languages. The study by Habok and Magyar (2018) examined the use language learning strategy (LLS) to learn foreign language. The study looked into the attitude, proficiency and general school achievement among lower secondary students in Years 5 and 8 (n = 868) in Hungary. An adapted version of the Strategies Inventory for Language Learning questionnaire was used for data collection. The results showed that Hungarian students mainly engage in metacognitive strategies in both years. Differences between more and less proficient language learners' strategy use have also been found. The metacognitive, social and memory strategies primarily influenced foreign language attitudes and marks in Year 5. The metacognitive strategies had a slight impact on school achievement as well as on foreign language marks. In addition, metacognitive strategies also influenced foreign language marks. The effect of foreign language marks on school achievement was also remarkable. There was a strong impact on the children's attitudes through these variables.

Another factor that can improve learners' learning attitude is through the use of graphic organisers. The study by Conley (2008) explored the effect of graphic organizers on the academic achievement of high school students receiving instruction in United States History via an online blended learning environment. With 60 participants in the study, the students were divided into two groups of 30 participants each. Group I was designated as the treatment group, while Group II formed the control group. A two-tailed t-test was used to determine that the means of the two post tests were not significantly different at a probability level of .05. Therefore, the results of this research study indicated that high school students who received instruction in United States History in an online blended learning environment using graphic organizers did not perform significantly

higher on the End-of-Course Test than high school students who did not receive instruction using graphic organizers.

A similar study by Kansizoglu (2017) showed that the use of graphic organizers has a significant effect on the students' success in language teaching and learning areas compared to traditional techniques. Accordingly, 70 experimental/quasi experimental studies in this area -which were conducted between 2000-2016 have been analysed with meta-analysis method. The data obtained from the study have been interpreted within random effects model. As a result, it has been detected that graphic organizers have a wide effect size on academic success rather than traditional teaching methods.

Graphic organisers have been proven to facilitate the teaching of writing skills. The study by Tayib (2015) investigated how graphic organizers influence students' writing ability as well as their attitudes towards this essential language skill. The sample of this study was composed of 24 Saudi male subjects registered in the preparatory program at Umm Alqura University during the academic year 2012-2013. The writing scores of the participants before and after the graphic organizers' intervention were compared and analyzed quantitative using the test of significance to see if there were any differences between means of the scores. The data generated through the writing attitude survey was analyzed qualitatively to detect any changes in students' attitudes. The results of this study proved that the graphic organizers model had significantly improved the students' writing ability and had positively impacted their attitudes towards this skill. These results suggest that graphic organizers can be an effective support in teaching writing of learners of English as a foreign language. Another study by Rahmat (2010) explored yet an alternative method for writers to learn to write paragraphs using colour codes as scaffolds. This method is rooted from the concepts of Selective Attention embedding colour codes as scaffolds. Colour codes are used to focus the learners' attention during the learning of academic writing. Modelling is used so learners can imitate the expected behaviour by the teachers. Graphic organizers are used as scaffolds for learners to write their essay. After one semester of using the techniques such as modelling, and scaffolding in the writing classroom, learners were asked to respond to a survey. 32 students participated in this action research. They responded to a questionnaire to reveal what they feel about this approach to ESL academic writing. The findings of this study reveal how students perceive learning ESL academic writing using the selective attention writing approach.

2.7 Theoretical Framework

Figure 7 presents the theoretical framework of the study. This study is rooted from Information Processing (Broadbent, 1958), Graphic Organiser Theory (IARS, 2003), through the use of Direct Strategy-Cognitive and Memory and also Indirect Strategy-Metacognitive) Oxford (1990). The base of this research is information processing, and this is done by passing through some theoretical components. To begin, sometimes the information that learners may be too much for them to handle- a cognitive overload seeps in. In this situation, the learner uses his/her memory to capture the existing knowledge to make the overloaded information manageable. One of the ways to make information

manageable is to convert the information to a form that the learners can easily identify with. The use of dual coding tis a form of cognitive language strategy where learners combine written information into another form-picture, or graphic organisers.

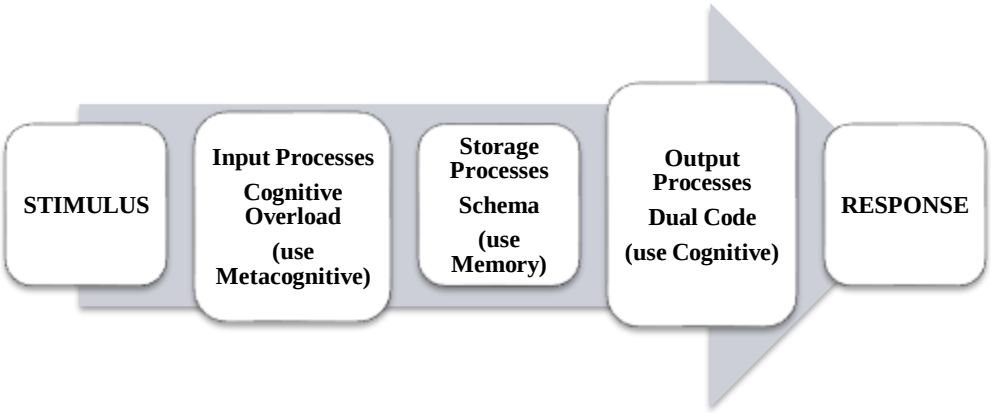

Figure 7: Theoretical Framework of the Study
(source: Boradbent, 1958; IARS, 2003 & Oxford, 1990)

3. Methodology

This qualitative study is done on 103 undergraduates learning English as a second language in a public university in Malaysia. The sample was chosen from students from different faculties. Participants attended a semester of language (reading and writing skills) learning English as a second language. Throughout the semester, the participants were exposed to the sue of graphic orgainsers both to learn reading and writing skills. At the end of the semester, they were asked to respond to a survey on how they felt about the use of graphic organisers in activities related to reading and writing skills. The instrument chosen was a survey containing 28 items using 5 Likert scale (strongly agree, agree, neutral, disagree and strongly disagree). The question asked were divided into cognitive overload, schema, and also dual code. Data collected is analysed using SPSS version 24. With reference to table 2, Cronbach alpha is done in the instrument and its was found to be 0.867 thus showing a strong internal reliability.

Reliability Statistics

Cronbach's Alpha	N of Items
.867	28

Table 1: Cronbach Alpha for Instrument

4. Findings

4.1 Introduction

This section discusses the findings of the study. Findings is presented based on the research questions presented in the previous section.

4.2 Language Learning Strategies and Graphic Organisers

RQ1: How do the use of graphic organisers influence the use language learning strategies?

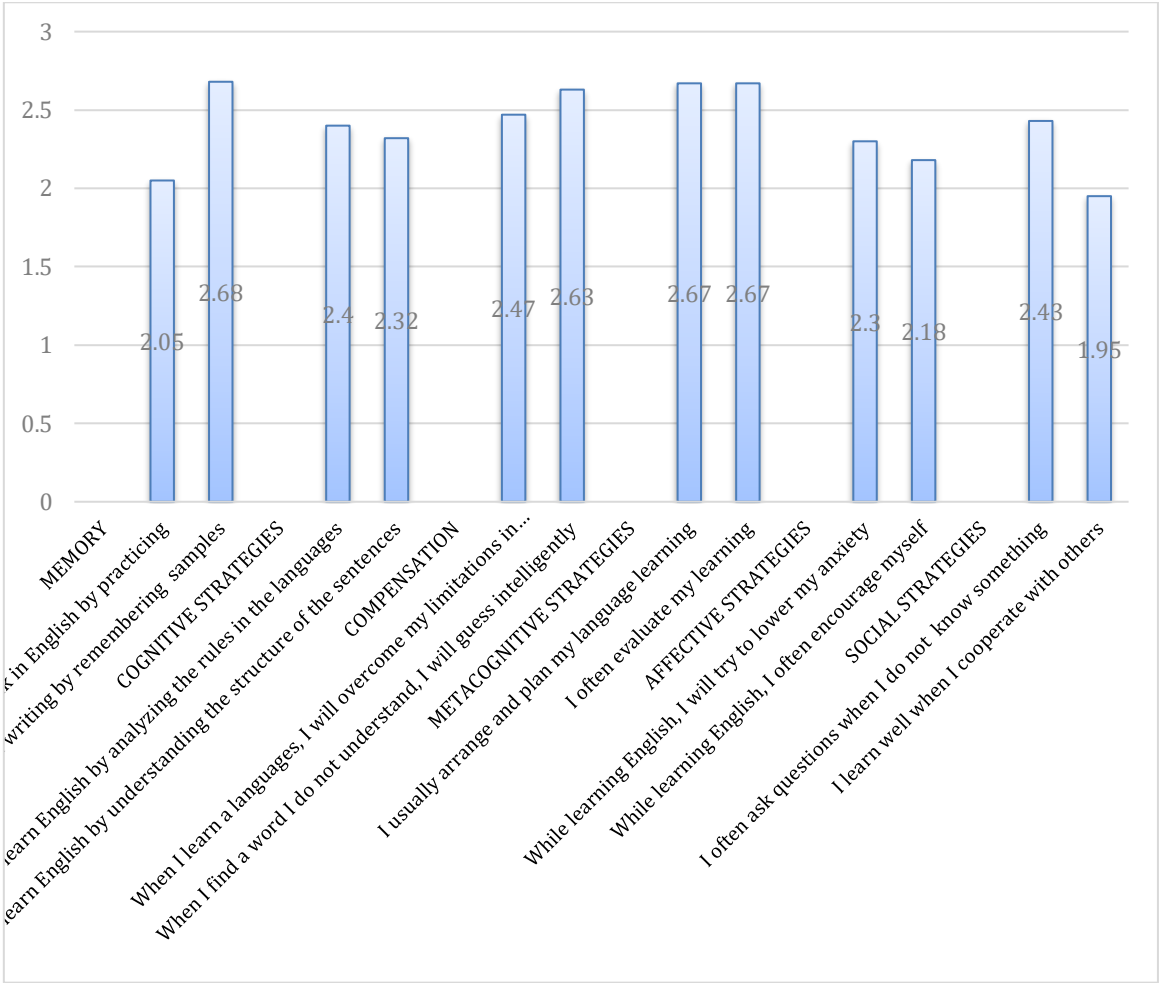

Figure 8: Mean for Language Learning Strategies

Figure 8 shows the mean score for language learning strategies. This study reported that the learners use memory strategies; especially when the learners tried to "*remember essay samples*" (2.68) they had encountered. The learners were also reported to use compensation strategies where there tried to "*guess intelligently*" (2.63). Finally, they also used metacognitive strategies when they "*plan*" (2.67) and "*evaluated*" their learning (2.67).

4.3 Cognitive Overload

RQ 2: How does cognitive overload influence the use of graphic organisers in language learning?

Cognitive overload refers to a situation where the information given is too much for the learner and the learner is not able to process the information. With reference to Figure 9, the respondents reported that the use of graphic organisers helped them understand the newly presented information even though they had "*no previous*

knowledge" (2.15). In addition to that, they felt that the use of graphic organisers helped them "*relate to their current learning*" (2.08).

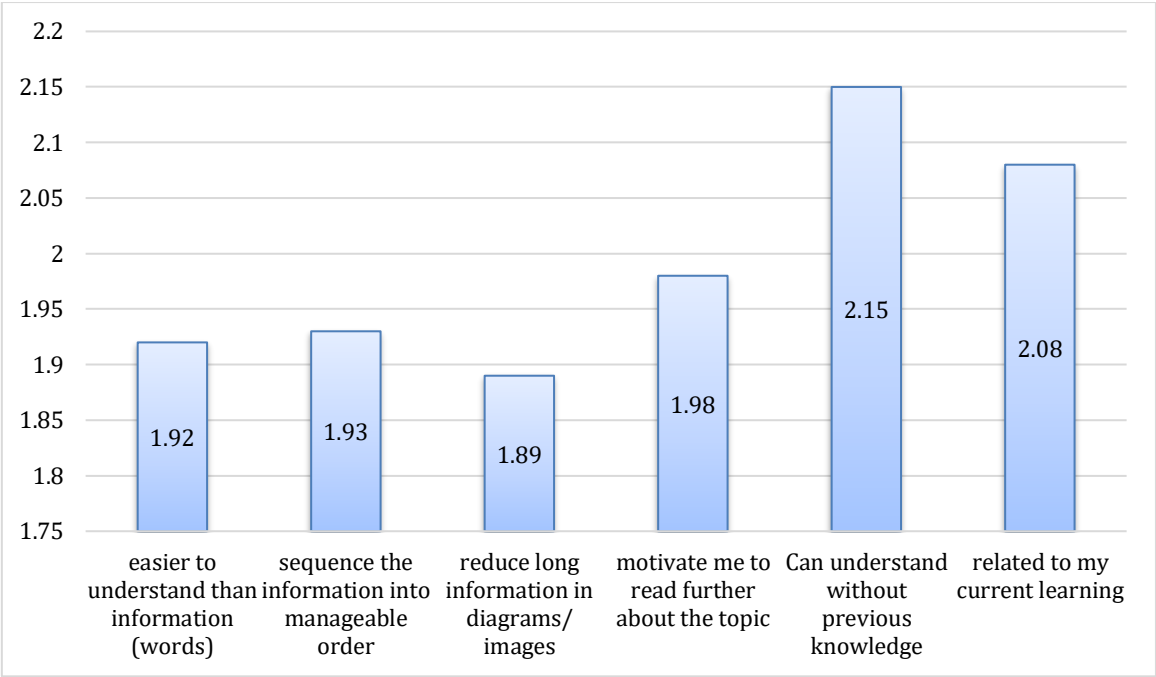

Figure 9: Mean for Cognitive Overload

4.4 Schema

RQ 3: How does schema influence the use of graphic organisers in language learning?

Figure 10 shows the mean for schema. Schema is a general idea about something. Having schema in the learners' mind helps the learner make a connection between the known and unknown. Respondents felt that the use of graphic organisers provided them in the form of schema as they helped the learners "*interpret language of the written text*" (2.05) using their prior knowledge. They also liked that graphic organisers helped them "*understand the content*" of the information better (1.87).

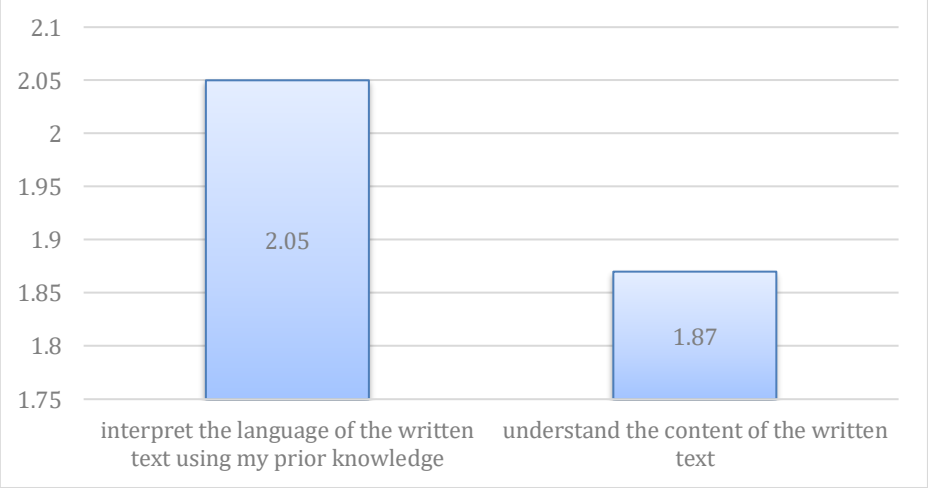

Figure 10: Mean for Schema

4.5 Dual Coding

RQ 4: How does the use of dual coding influence the use of graphic organisers in language learning?

Figure 11 reveals the mean score for dual coding. One interesting benefit of the sue of graphic organisers to learn a language is that the learners get to "*convert information into graphic*"(2.71) form. In addition to that, graphic organisers also help the learners to "*associate pictures with their future knowledge*" (2.49).

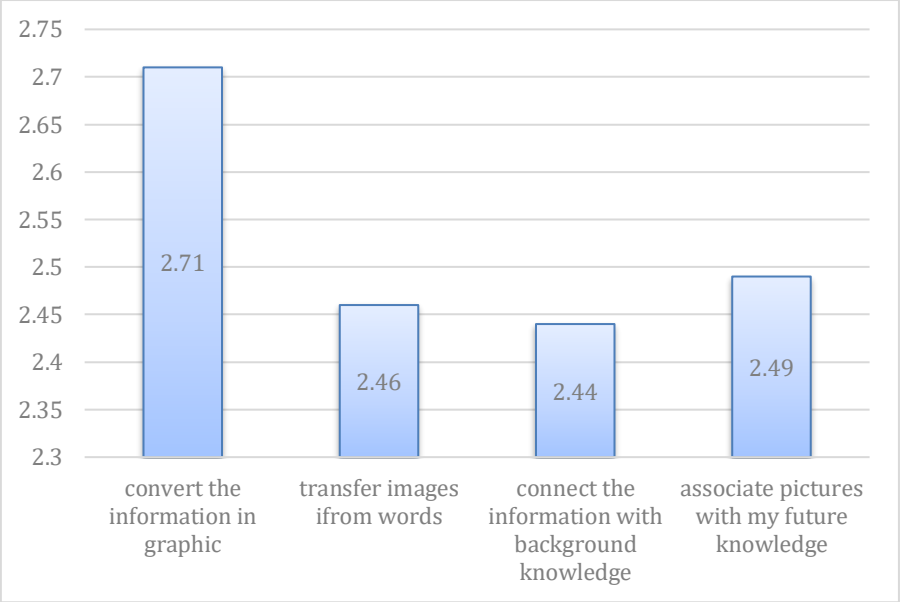

Figure 11: Mean for Dual Coding

5. Conclusion

5.1 Summary of Findings and Discussion

Learning a second or foreign language helped by using direct strategies such as memory and compensation strategies. Learning can be further facilitated by using indirect strategies such as metacognitive strategies. The study by Habok and Magyar (2018) also reported that the use of strategies like memory and metacognitive strategies have been proven to help the learning of foreign language.

This study has further reported that the use of language learning strategies is further supported with the use of graphic organisers. This finding is in accordance with the study by Conley (2008) who also explored the positive effects of graphic organisers on students' learning. This is also supported by another study by Kansizoglu (2017) who reported similar findings that showed the use of graphic organisers helped language learning. The use graphic organisers helped reduce the impact of cognitive overload of the information given. This finding is in accordance with the studies by Tayib (2015) and Rahmat (2010) who reported that graphic organisers facilitated in the learning of writing skills. Learners can use their existing schema to make sense of the new information given. Using graphic organisers also helped learners to dual code the information from the written form to graphic form.

5.2 Pedagogical Implications

Learners learn second or foreign languages using more than one language learning strategies to help process information in the target language. Language teachers should consider what best suit learners in different situations when planning language learning activities. In addition to that, the use of graphic organisers have been proven by many researchers to make learning more interesting. Future research could focus on investigating the relationship between individual language learning strategies and graphic organisers.

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Noor Hanim Rahmat is an associate professor who has taught the university for the past 26 years. Her research interest includes Methodology of Teaching Writing, Academic Writing, ESL proficiency, Educational Psychology, as well as Language Studies. She has written several chapters in books, authored some books, journal articles, as well as presented at conferences.

References

Broadbent, D. (1958). *Perception and Communication.* London: Pergamon Press.

Carufel, R. (2018). No, Millennials' Attention Spans aren't Shrinking-They're Getting More Selective. Agility-PR Solutions. Retrieved from https://www.agilitypr.com/pr-news/public-relations/no-millennials-attention-spans-arent-shrinking-theyre-getting-more-selective/.

Conley, G. K. (2008). The Effect of Graphic Organisers on the Academic Achievement of High School Students in United States History who received Instruction in Blended, Computer-Based Learning. A Doctoral Dissertation School of Education, Liberty University. Retrieved from https://core.ac.uk/download/pdf/58825092.pdf

Delrose, L. N. (2011). Investigating the Use of Graphic Organisers for Writing. Masters Dissertation, Louisiana State University, Retrieved from https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=3536&context=gradschool_theses.

Goh, E. (2019). Gen Zs and Millennials, Your Learning Attention Span Isn't Just 8 Seconds. Smartup. Retrieved from https://www.smartup.io/2019/08/05/gen-zs-and-millennials-your-learning-attention-span-isnt-just-8-seconds/.

Habok, A., Magyar, A. (2018). The Effect of Language Learning Strategies on Proficiency, Attitudes and School Achievement. Frontiers in Psychology, Retrieved from https://www.frontiersin.org/articles/10.3389/fpsyg.2017.02358/full.

Hardan, A. A. (2013). Language Learning Strategies: A General Overview. Procedia Social and Behavioural Sciences. Vol 106. Pp 1712-1726. Retrieved from https://core.ac.uk/download/pdf/82653331.pdf

Hoy, W. K., & Miskel, C. G. (2008). *Educational administration theory, research, and practice* (8th ed.) (E. Barrosse & D. S. Patterson, Eds.). New York: McGraw Hill.

Institute for the Advancement of Research in Education. (2003). *Graphic organizers: a review of scientifically based research.* Retrieved from http://www.inspiration.com/sites/default/files/documents/Detailed-Summary.pdf.

Kansizoglu, H. B. (2017). The Effect of Graphic Organizers on language Teaching and Learning Areas: A Meta-Analysis Study. Education and Science. Vol 42(191) pp 139-164. Retrieved from https://www.researchgate.net/publication/318253303_The_Effect_of_Graphic_Organizers_on_Language_Teaching_and_Learning_Areas_A_Meta-Analysis_Study

Laskaris, J. (2015). How to Engage Millennials: Important Moves. eLearning. Retrieved from https://www.efrontlearning.com/blog/2016/03/5-strategies-to-engage-the-millennials.html.

Meltzer, D. (2017). Combating the Millennial Attention Span to Keep your Team Engaged. Entrepreneur Insider. Retrieved from https://www.entrepreneur.com/article/297833.

O'Malley, J. M. & Chamot, A. U. (1990). Learning Strategies in Second Language Acquisition. Cambridge, U.K.: Cambridge University Press.

Oxford, R. L. (1990). Language Learning Strategies: What Every Teacher Should Know. Boston: Heinle & Heinle.

Rahmat, N. H. (2020). Innovation in Education: Barriers and Facilitating factors. European Journal of Education Studies. Vol 6(10, pp 55-66.Retrieved from https://oapub.org/edu/index.php/ejes/article/view/2784.

Rahmat, N. H. (2018). Scaffolding Colour Codes and SAW Approach in ESL Academic Writing. European Journal of English language Teaching, Vol 491), pp 22-34. Retrieved from https://oapub.org/edu/index.php/ejel/article/view/1881.

Sharma, A. (2018). Designing Learning for Millennials. Association for Talent Developer. Retrieved from https://www.td.org/magazines/td-magazine/designing-learning-for-millennials.

Rahmat, N. H. (2011). Approaches in the Teaching of ESL Writing. Selangor, Malaysia: UiTM Press.

Tayib, A. (2015). The Effect of Using Graphic Organisers on Writing (A Case Study of Preparatory College Students at UMM-Al-Qura University). International Journal of English Language and Linguistics Research. Vol 3(1), pp15-36. Retrieved from http://www.eajournals.org/wp-content/uploads/The-Effect-of-Using-Graphic Organizers-on-Writing.pdf.